

Deep Space Engine (Previously Bipropellant In-Space Engine - ISE 100)

Completed Technology Project (2016 - 2018)



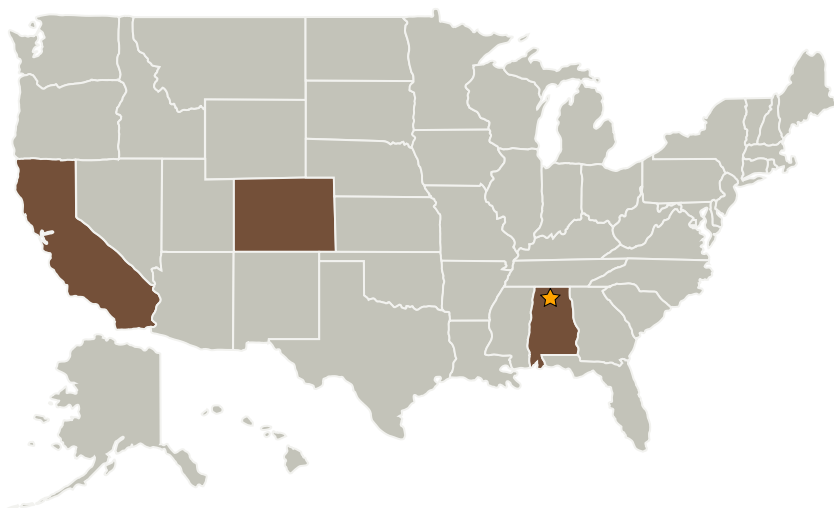
Project Introduction

Advancing deep space thruster technology of MON25/MMH bi-propellant. MON25/MMH has never been flown in space, however this technology allows us to build lighter, physically smaller, and cheaper engines that can operate at much colder environments than previously flown. Propellant that can operate at colder temperatures requires less power for propellant conditioning in deep space, thus lowering battery mass requirements. This technology provides more payload volume, power, and mass for deep space missions than currently available. The MON25/MMH thrusters are baselined to fly demonstration missions on the commercial CATALYST partner, Astrobotic, lunar lander as well as the NASA Resource Prospector Mission Lander. The objective is to fly the Astrobotic lander by December 2019.

Anticipated Benefits

NASA Funded: Enhances thrust/performance capability for Resource Prospector and future missions. **NASA Unfunded:** Enables larger science payloads because thruster is lighter, smaller and lower cost than other engines in its class. **OGA:** Provides a lighter, smaller, less expensive main engine option for any government project that operates in the space environment. **Industry:** Astrobotic Technology, a Lunar CATALYST company has baselined this engine for their Perigrine lander. ISE-100 will provide a very attractive thruster option to industry because of its reduced size, mass and cost. **Nation:** Promotes NASA's mission to explore new destinations, with high performance that is attractive economically.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★ Marshall Space Flight Center (MSFC)	Lead Organization	NASA Center	Huntsville, Alabama

Co-Funding Partners	Type	Location
Exploration Capabilities	NASA Program	

Primary U.S. Work Locations	
Alabama	California
Colorado	

Project Transitions

▶ **October 2016:** Project Start

✓ **January 2018:** Closed out

Closeout Summary: The DSE project is advancing technology that will allow a monopropellant thruster to operate at much lower temperatures for enhanced planetary surface access. The project focused on a 100-pound force thruster designed to be more compact and lightweight, that used a low cost chemical propulsion system. The project demonstrated a thruster design that could ignite at very low temperatures enabling extreme environment operation after long duration storage. The DSE project completed the risk reduction development and hot-fire testing needed to move into the engine qualification stage of development.

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Game Changing Development

Project Management

Program Director:

Mary J Werkheiser

Program Manager:

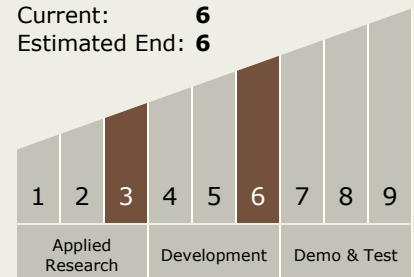
Gary F Meyering

Principal Investigator:

Gregory L Barnett

Technology Maturity (TRL)

Start: **3**
Current: **6**
Estimated End: **6**



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Target Destinations

The Moon, Mars, Others Inside the Solar System